

Total No. of Questions : 12]

SEAT No. :

P3234

[Total No. of Pages : 3

[4859] - 1012

**B.E. (Civil) (Semester - I)**  
**EARTHQUAKE ENGINEERING**  
**(2012 Pattern) (Elective - II)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates :*

- 1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6 , Q7 or Q8, Q9 or Q10, and Q11 or Q12.*
- 2) Figures to the right indicate full marks.*
- 3) IS 456, IS 1893, IS 13920 are allowed in the examination.*
- 4) Neat diagrams must be drawn wherever necessary.*
- 5) If necessary, assume suitable data and indicate clearly.*
- 6) Use of electronic pocket calculator is allowed.*

**Q1) a) Define :** **[4]**

- i) Focal Depth
- ii) Inter plate Earthquake

b) Explain the causes and types of earthquake. **[6]**

OR

**Q2) a) Define Isoseismal and describe their uses?** **[4]**

b) What do you understand by Magnitude and size of earthquake?  
Classify the earthquake based on magnitude. **[6]**

**Q3) A simply supported beam 4 m long supports mass of 1000kg at the center. Find the natural period and natural frequency.  $E = 2.1 \times 10^6 \text{ kg/cm}^2$  &  $EI = 10,000 \text{ kN.m}^2$ .** **[6]**

OR

**P.T.O.**

- Q4)** a) Derive the equation of motion for a damped but free vibration of a SDOF system. [3]
- b) Convert the mass  $m = 20,000\text{kg}$  supported as shown in figure 4.1 into a mass and equivalent spring system (SDOF). Assume stiffness of each column  $3\text{kN/m}$  for first and second storey and  $2\text{kN/m}$  for top storey. [3]

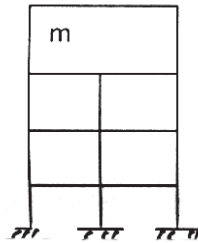


Fig. 4.1

- Q5)** Explain the following terms (Any two) : [6]
- Seismic Zoning.
  - Vertical irregularity in buildings.
  - Weak storey and Soft Storey.

OR

- Q6)** a) Calculate the distribution of base shear at each floor level as per seismic coefficient method for the OMRF without brick infill building shown in Fig. 6. 1. The building is located in Zone V. The frames are spaced at  $4\text{m c/c}$ . Assume soil of Type II. [6]

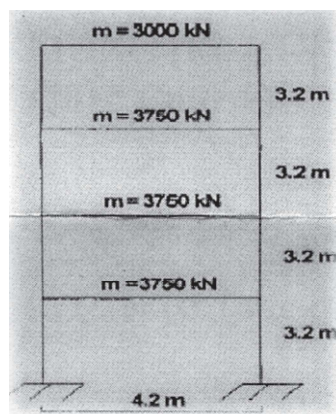


Figure 6.1

- Q7)** A  $(400 \times 400)\text{mm}$  column is reinforced with 8 - 16 # It is supported on isolated footing. The load coming on the footing is  $450\text{ kN}$  and a moment of  $30\text{ kN-m}$ . The SBC of the soil is  $150\text{ kN/m}^2$  Using M 25 grade of concrete and steel of grade Fe 415 Design footing. [16]

OR

- Q8)** a) What is Liquefaction? Write effects of liquefaction. [4]  
b) What are the different soil improvement techniques to reduce liquefaction. [6]  
c) What type of forces generated due to earthquake and Explain its effect on foundation. [6]

- Q9)** a) What are the various methods available to control the lateral forces acting on a structure? Explain in details. [8]  
b) What are the basic precaution to be followed in rescue operations. [8]

OR

- Q10)** a) What is disaster management? Explain its various phases. [8]  
b) Define Active and Passive control. Write different types of the passive control system and explain any one example. [8]

- Q11)** a) What is retrofitting and rehabilitation of structures? [8]  
b) Explain the Shear Wall and its behavior? [10]

OR

- Q12)** a) Explain the techniques used for strengthening RCC beams and Columns. [8]  
b) Explain any three retrofitting techniques used for masonry buildings? [10]

